

电力系统

采用改进免疫算法的多目标配电网重构

李樊, 刘天琪, 江东林

四川大学 电气信息学院, 四川省 成都市 610065

摘要:

针对配电网重构问题建立以最小化网损、最小化负荷均衡度、最大化静态电压稳定性三个目标的多目标优化模型。在此基础上,应用基于目标序列排序矩阵评价个体亲和度及随机生成综合亲和度权重的免疫算法,求得配电网重构的Pareto最优解集,实现真正的多目标优化。对可行解变异率进行自适应调整,通过自适应变异操作和免疫疫苗接种来保证抗体的多样性和全局最优解的生成,提高了每次生成的可行解比例,并结合免疫记忆机制保证了算法向全局最优解的收敛。针对一实际69节点系统的仿真结果表明所建模型及求解算法的可行性和有效性。

关键词: 配电网重构 免疫算法 综合亲和度 变异

Distribution Network Reconfiguration With Multi-Objective Based on Improved Immune Algorithm

LI Fan, LIU Tianqi, JIANG Donglin

School of Electrical Engineering and Information, Sichuan University, Chengdu 610065, Sichuan Province, China

Abstract:

A multi-objective optimization model is established with three objectives of minimizing the network losses, minimizing the degree of load blancing and maximizing the static voltage stability for the distribution network reconfiguration problem. On this basis, a multi-objective immune algorithm which ranks the gene by comparing their performance in each objective function through the sorting matrix created by the objective function with comprehensive affinity weight randomly generating, a optimal Pareto solution set of distribution network reconfiguration is obtained and the true multi-objective optimization is achieved. The mutation rate of feasible solutions is determined by the adaptive method, and the diversity and the global optimal solutions' generation are achieved by adaptive mutation and vaccination, the proportion of feasible solutions has also increased, the convergence to the global optimal solution is ensured by immune memory. An example indicates that the fairly rational solutions can be obtained with this method.

Keywords: distribution network reconfiguration; immune algorithm comprehensive affinity mutation

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通讯作者: 李樊

作者简介:

作者Email: 573286191@qq.com

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